

branches),  $3 \times 80-90$  mm., closely subannularly flowered; peduncle 25 mm. long, bracted near the middle; bracts round-peltate; berries oblong, truncate with stout spreading beak; stigma on the truncated apex.

Type in the U. S. National Herbarium, no. 1,196,573, collected between Baños and Cashurco, Valley of Río Pastaza, Province Tungurahua, Ecuador, alt. 1300-1800 meters, September 25, 1923, by A. S. Hitchcock (no. 21886).

***Peperomia subanomala*, sp. nov.**

A rather small erect branching herb; stem slender (1-2 mm.) rather long-hairy but glabrescent except about the nodes; leaves opposite, elliptic, subacute at both ends, rather small ( $7 \times 14-10 \times 20$  mm.), slightly pubescent on the nerves above, somewhat revolute, densely long-hairy beneath, obscurely 3-nerved, firm and opaque; petiole short (2 mm.), hairy or subglabrescent; spikes terminal and axillary, moderately small ( $1 \times 30$  mm.), rather closely flowered; peduncle 5 mm. long, glabrous; bracts round-peltate; ovary ovoid, impressed; stigma subapical.

Type in the U. S. National Herbarium, no. 1,197,533, collected at Ambato, Province Tungurahua, Ecuador, alt. 2500 meters, in 1924, by G. H. H. Tate (no. 542).

***Peperomia subcncava*, sp. nov.**

A moderately small more or less caespitose simple erect arboricolous herb; stem rather slender (scarcely 2 mm.), at first puberulent or glabrous; leaves about 3 at a node, round-elliptic or obovate, rounded at both ends or the base subacute, very fleshy, drying thick with hyaline margin and not obviously nerved,  $10 \times 10-15$  mm., somewhat pubescent to quite glabrous; petiole short (3 mm.) and thick, granular-puberulent or glabrous; inflorescence unknown.

Type in the U. S. National Herbarium, no. 1,196,467, collected between Cuenca and Huigra, Provinces Azuay and Cañar, Ecuador, alt. 2700-3000 meters, September 12-13, 1923, by A. S. Hitchcock (no. 21686).

***Peperomia tequendamana*, sp. nov.**

An ascending moderately small more or less branched herb; stem moderate (2-3 mm.) with short internodes, rusty crisp-villous; leaves alternate (? exceptionally opposite), broadly elliptic or ovate-elliptic, obtuse at both ends or abruptly blunt-acuminate, moderate ( $1.5 \times 2-2 \times 4$  cm.), 5-nerved, appressed-hairy on both faces, granular beneath; petiole very short (2 mm.), hairy; spikes terminal and axillary,  $2 \times 60$  mm., rather loosely subverticillately flowered; peduncle about 10 mm. long, from sparsely crisp-pubescent glabrescent; bracts round-peltate; ovary impressed, ovoid, obtuse; stigma subapical.

Type in the U. S. National Herbarium, no. 1,198,754, collected at Tequendama Falls, near Bogotá, Dept. Cundinamarca, Colombia, September 1909, by Brother Ariste Joseph (no. B-92).

**BOTANY.**—On *Gyranthera* and *Bombacopsis*, with a key to the American genera of Bombacaceae. H. PITTIER, Caracas, Venezuela.

In his recent revision of the *Bombacaceae*,<sup>1</sup> Mr. R. C. Bakhuizen van den Brink has confessed himself unable to place my genus *Gyran-*

<sup>1</sup> *Revisio Bombacacearum*, in Bull. Jard. Bot. Buitenzorg, Ser. III, 6: 161-232; pl. 26-38. 1924.

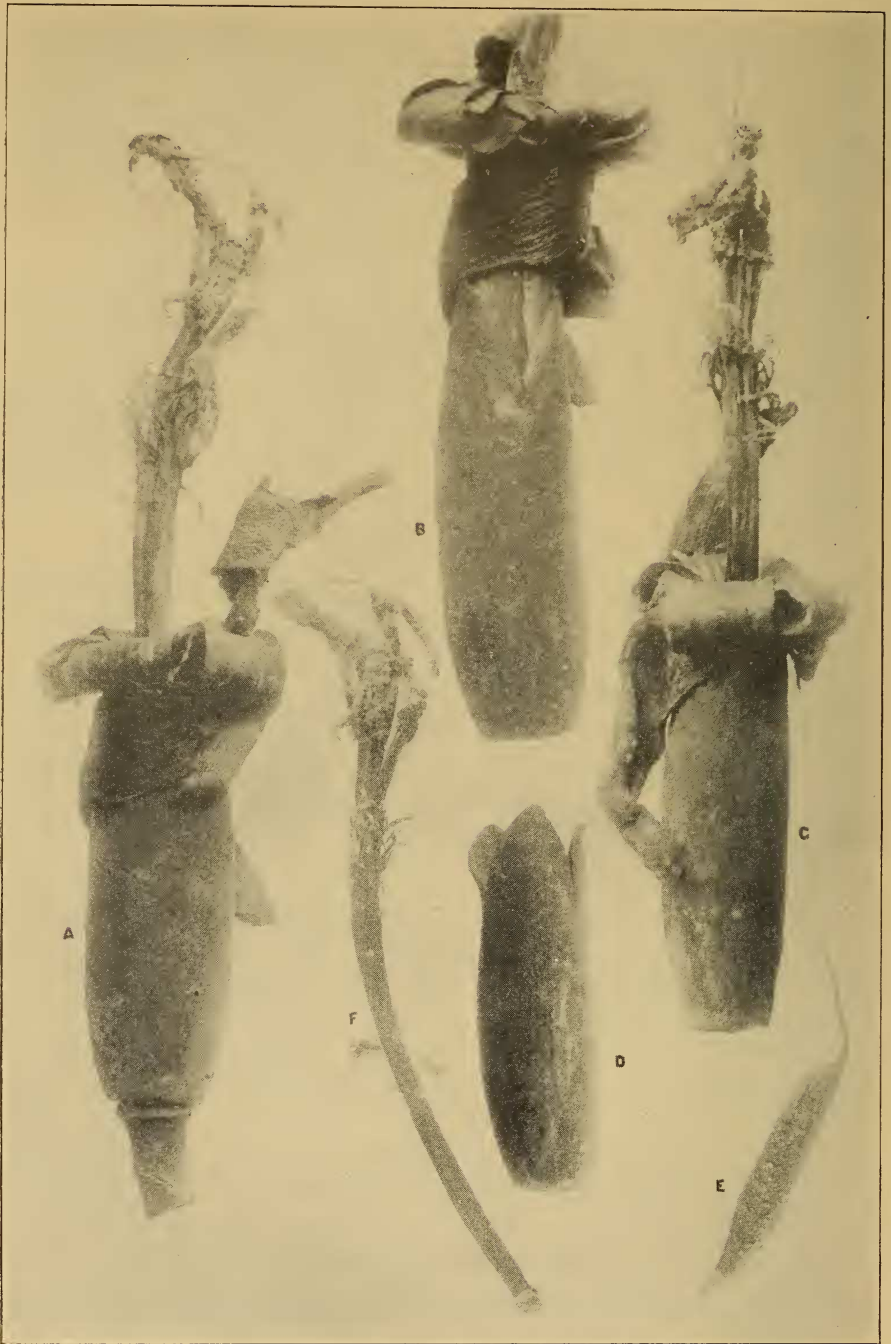


Fig. 1—Flowers of *Gyranthera*: A-C, general views showing details of the petals; D, calyx; E, anther with the connective stipitate and auriculate at the base, long awned at the apex. All about  $\frac{1}{2}$  dia.

*thera*, described in 1914 from specimens of the Panaman species.<sup>2</sup> In 1921<sup>3</sup> I published a second species, *Gyranthera caribensis*, in a paper in which I gave all the additional details necessary to characterize the new genus definitely, and to place it rightly among the *Bombacaceae*. If the author had consulted this paper, presumably accessible to him, the description of the fruit alone would have convinced him that *Gyranthera* really belongs to the *Bombacaceae*, and further that it is not to be associated with *Chorisia*.

In order better to establish the status of *Gyranthera* as a valid genus, its description is given here again, emended and amplified so as to show more clearly the characters which differentiate it. The illustrations, reduced to one-half natural size, show the principal features of the flower and fruit.

#### DESCRIPTION OF THE GENUS GYRANTHERA PITTIER (1914)

Flores regulares vel leviter zygomorphi. Calyx coriaceus, tubulosus, caducus, plus minusve regulariter 2 vel 3-lobulatus, lobulis perbrevibus, integris bicuspidatisve, in aestivatione valvatis. Petala 5, laciniata, crassa, basi, tubo stamineo adnata, prefloratione contorta. Tubus stamineus teres vel sulcatus, elongatus, gracilis, longe exsertus, apice versus staminodiis lineari-filiformibus plus minusve sparsis appendiculatus; filamenta 5, crassa, antheris permultis, vermiformibus, dithecis obsita; thecae transverse septatae; connectivum basi subsessile vel distincte stipitatum, apice emarginatum ongue mucronatum; pollinis granula pallide flava, laeves, diminuta. Ovarium superum, sessile, 5-carpidiatum, 5-loculare; ovula transversa, anatropa, angulo interno locularum affixa; stylus filiformis, stamina longior, stigmate breviter 5-fido. Capsula plus minusve fusiformis, unilocularis, coriacea vel sublignosa; dehiscentia loculicida. Semina numerosa, alata, albuminosa; embryo leviter curvatus.

Arbores sylvarum panamensium et venezuelensium, altae, deciduae, inermes. Folia alterna, 3-7-digitata, longe petiolata, foliolis integris, petiolulatis. Flores magni, albi, ebracteati, in panniculas terminales, unilaterales, dispositi.

From this description it will be seen that *Gyranthera* differs fundamentally from *Chorisia* in its capsule, in which the ovarian cell-walls have been almost completely obliterated; in the shape and disposition of the winged seeds; and especially in the general structure and appearance of the flower. The same conclusion may be more quickly reached by comparing plate 40 of volume 12, part 3, of Martius's *Flora brasiliensis* with the illustrations added to this article. The affinities of the new genus are evidently with the *Matisiae*,—I would say with *Quararibea* and *Ochroma* with regard to the floral

<sup>2</sup> *Malvaes novae panamenses*, in Repert. Nov. Sp. Fedde 13: 318. 1914.

<sup>3</sup> *Acerca del genero Gyranthera Pittier*, in Bol. Com. Ind. Venezuela 13: 417-433. 1921.



structure, and with *Bernoullia* as to the fruits. But our plant differs from all three in its digitate leaves and from each in particular by decidedly aberrant characteristics, such as the presence of staminodes disposed in two more or less regular whorls, each staminode simple or bifurcated in the upper whorl, bifid or trifid in the lower whorl. The arrangement of the seeds also is remarkable and *sui generis*: while in *Bernoullia*, the wings are simply turned upward at the base and downward at the apex of each cell of the capsule, in *Gyranthera* they are so placed in the single cell that two consecutive wings of the lower seeds are separated by the wing of one of the upper ones. This is neatly shown in figure B, of the accompanying Fig. 2.

The above description is far from perfect. The arrangement of the anthers, on account of their peculiar gelatinous consistency when fresh, has not yet been sufficiently elucidated. The fruit of the Panaman species is not known. But it seems that there can be no doubt as to the validity of the genus and its place in the classification, somewhere between *Quararibea* and *Bernoullia*.

Mr. Bakhuizen van den Brink also ignores the genus *Bombacopsis*, published by me in 1916, based on *Pachira Fendleri*.<sup>4</sup> I am quite aware that any botanist who is reduced to mere herbarium specimens or scanty descriptions upon which to base his judgment may hesitate to accept any further splitting of the genera *Bombax* and *Pachira*. Schumann himself even went so far as to unite these two last groups into a single one, *Bombax*, thus going back to the Linnean generic concept. This, however, has not generally been accepted, and most botanists admit that there is at least a decided difference between the two groups. They are as a matter of fact separated by fundamental differences in the fruit and seed, and by no small structural details of the flowers. Without going farther into details, let us recall the presence or absence of wool in the fruit and the considerable size of the seeds of *Pachira* as compared with those of *Bombax*.

In the course of my explorations in Panama, my attention was drawn to two striking trees, originally placed among the species of *Pachira*, the one by Seemann under the name of *P. Fendleri*, the other by Bentham as *P. sessilis*, and transferred to *Bombax* by subsequent authors. The flowers of these two trees look exactly like miniatures of those of the genus *Pachira* and, as the fruits had not then been described, both botanists were to a certain extent justified in the generic place assigned to these species. But when the fruits became known, they proved to have the structure of those of *Bombax*,

<sup>4</sup> Contr. U. S. Nat. Herb. 18: 159-163, pl. 64-75. 1916



Fig. 2—Fruit of *Gyranthera*: A, capsule before dehiscence; B, part of open capsule showing arrangement of seeds; C, detached seeds, one open to show details of embryo. Same reduction as in Fig. 1.

with small seeds imbedded in the wool depending from the pericarp. That is to say, these trees, on account of their fruits, do not belong to *Pachira* nor, because of the characteristics of the flowers, to *Bombax*. In other words, they belong neither to *Bombax* nor *Pachira*. The simplest solution was, then, to create an intermediary genus, and this is what I did under the name *Bombacopsis*.

As a general rule, I do not believe in the multiplication of generic names at the expense of well-established groups, but that there are cases when the necessity of the division becomes more and more obvious. Two good instances have attracted my attention in the course of an experience of nearly forty years in neotropical botany. I refer to the genera *Pithecolobium* and *Cassia*. When one comes to know the species of the first by daily observation, ordinary common sense leads one to separate them into several groups. There is certainly no macroscopic likeness between a *Pithecolobium* of the *unguis-cati* group and the rain-tree (*P. saman* Benth.); and again, it is difficult to see the direct parental connection of the latter with the sections *Caulanthon* and *Chloroleucon* as created by Bentham.

I think that Merrill was right when he proposed to make *Pithecolobium saman* the type of the distinct genus *Samanea*,<sup>5</sup> and so I have followed him in naming several recently described species. Britton and Rose are now trying to effect an analogous division in the compound genus *Cassia*, and it is to be hoped that their views will be accepted, at least along general lines. These same authors, however, have not always been very moderate in their views. Few botanists, I think, would agree to accept their extreme splitting of certain genera of *Cactaceae*, in which each section has been proposed as a genus.

To return to *Bombacopsis*, let us repeat that in this group the flower, notwithstanding its likeness to that of *Pachira*, differs markedly in its size, in the longer and narrower calyx, in the number and branching of the stamens, as well as in the wool-bearing fruit and the smaller dimensions of the seeds. On the other hand, if the fruit compares with that of *Bombax* in its general characteristics, the dehiscence is apical with the valves, coriaceous or at least thin, adhering to the receptacle, while in *Bombax* these valves are woody and thick and detach themselves piece after piece from the fruit. The flowers, also, have at most 200 stamens and often not more than 75, while up to 1400 have been counted in some individual *Bombax* flowers.

These are the more distinctive botanical features which separate

<sup>5</sup> This JOURNAL 6: 47. 1916.

the three genera. But in the field nobody would confuse a *Bombax* tree, with its relatively short, thick or ventricose trunk, nor a middle-sized, leafy *Pachira*, with the often enormous individuals of *Bombacopsis*, with its straight column or trunk and sparsely leaved crown towering among the highest in the forest. In *Pachira* and *Bombax* the wood is white and soft and the bark smooth; in *Bombacopsis* the core of the former is reddish and much harder, and the bark, rough and rimose, is often covered with numerous, stout aculei. More details and many illustrations will be found in the place of the original description.

As is natural, I have expanded on the two genera *Gyranthera* and *Bombacopsis*, because, as my own creations, I had their defense very much at heart. It seems almost impossible not to recognize the validity of *Gyranthera*; and as to *Bombacopsis*, which I find necessary as a transitory link between *Bombax* and *Pachira*, its acceptance depends mainly upon whether the two latter genera remain separated, as seems best, or whether the view of Schumann is to be maintained. Most American botanists adopt the former view and so does Urban in his *Symbolae Antillanae*<sup>6</sup> and Mr. Backhuizen in his "Revisio."

In the latter we note the presence of genus *Montezuma*, as "arbor mexicana." As shown by Standley and Urban<sup>7</sup> as early as 1921, the species probably was never found in Mexico and is identical with the Porto Rican *Thespesia grandiflora*, the type of Urban's new genus *Maga*. *Montezuma* is recognized as belonging to the *Malvaceae* and must be dropped from the *Bombacaceae*. On the other hand, Backhuizen does not mention *Spirotheca*, separated from *Ceiba* prior to 1924 by Ulbrich,<sup>8</sup> who also described in October of that year another Austro-American genus *Septotheca*.<sup>9</sup>

As known today, the American genera of the *Bombacaceae* may be tentatively keyed as follows:

- Fruit capsular, dehiscent, large, 5-celled or, in one case 1-celled on account of the disappearance of the walls; calyx caducous; seeds numerous.
- Seeds round and smooth, exalate; leaves digitate or, in one case, palmate (*Bombacineae*)
- Seeds large (1.5 cm. in diam. or more), imbedded in the fleshy dissepi-  
ments of the endocarp; flowers large and long (up to 35 cm.);  
stamens numerous; filaments repeatedly dichotomous; leaves  
digitate.....1. *Pachira*

<sup>6</sup> Vol. 8, page 427.

<sup>7</sup> Notizbl. Bot. Gart. Mus. Berlin 7: 543. 1921.

<sup>8</sup> Ibid. 6: 160. 1914.

<sup>9</sup> Ibid. 9: 123. 1924.



Seeds small (not over 1 cm. in diam.), surrounded by wool derived from the endocarp.

Fertile stamens numerous, the upper part of the filaments free, simple or bifurcated, without appendices or staminodes.

Flowers slender and long (up to 15 cm.); stamens 75-200; capsule ovoid or pentagonous 18 cm. long or less....2. *Bombacopsis*

Flowers thick and short, the stamens very numerous (up to 1400); capsule fusiform, 15 cm. long or more.....3. *Bombax*

Fertile stamens 5 or 10, more or less adnate; staminodes sometimes present.

Stamens 5, the upper part of the filaments free.

Calyx 3-5-lobed; anthers simple, certain species with staminodes.....4. *Ceiba*

Calyx truncate; anthers double; no staminodes....5. *Spirotheca*

Stamens with the filaments completely adnate.

Anthers 10, straight; gynophor with a cuff-like whorl of 5-bifid staminodes; leaves digitate.....6. *Chorisia*

Anthers 5, vermiform; no staminodes; leaves palmately lobed.....7. *Ochroma*

Seeds winged; calyx more or less regularly 2-5-lobed; leaves digitate (*Gyranthereae*).

Capsule 1-celled, with 8-12 seeds in all; staminal tube closed nearly to the apex; anthers vermiform; staminodes present....8. *Gyranthera*

Capsule 5-celled, with 8-12 seeds in each cell; staminal tube split open almost from the base; anthers short, oblong; no staminodes.

9. *Bernoullia*

Fruit drupaceous, samaroid or capsular, but small; seeds 1-5; calyx mostly persistent; stamens mostly adnate, the anthers 1-celled; leaves simple, trinerved (*Matisiae*).

Stamens united in 5 bundles; fruit samaroid.....10. *Cavanillesia*

Stamens united in a single tube.

Staminal tube very short, the upper part of the filaments free and bearing a simple anther; fruit capsular.

Calyx truncate; filaments evenly thin.....11. *Hampea*

Calyx 5-partite; filaments thicker toward the apex....12. *Catostemma*

Staminal tube long, more or less deeply 5-partite at the apex, this covered with sessile anthers.

Staminal tube with 5 apical teeth; anthers 30-40; fruit subcapsular.

13. *Quararibea*

Staminal tube 5-branched at the apex.

Anthers 6-12, ovate-oblong, undivided; fruit drupaceous.

14. *Matisia*

Anthers more numerous, vermiform, irregularly divided into several cells.....5. *Septotheca*